Appendix C

United States Army Corps of Engineers Preliminary Restoration Plans: Drayton Dam.

CEMVP-PM-B 17 October 2003

MEMORANDUM FOR Commander, Mississippi Valley Division (CEMVD-MD-PP/L. Cool), P.O. Box 80, Vicksburg, Mississippi 39181-0080

SUBJECT: Drayton Dam Section 206 Project – Preliminary Restoration Plan

1. The Preliminary Restoration Plan (PRP) for the Drayton Dam Section 206 project is submitted for approval.

2. The Preliminary Real Estate Plan (PREP) is also enclosed.

3. We request authorization and funding to prepare an integrated Ecosystem Restoration Report and Environmental Assessment (ERR/EA).

4. The CEMVP point of contact for the project is Mr. Elliott Stefanik at 651-290-5260.

Encl (10 cys)

JUDITH L.A. DESHARNAIS, P.E.
Deputy for Programs and Project Management

Kruchten PM-B ____
Stefanik PM-E ____
Crump EA ____
Spitzack PM-B ____
DesHarnais DPM ____

File name: Post ITR.PRP.Drayton.206

Date: 17 October 2003

Division: Mississippi Valley
District: St. Paul

Section 206 Preliminary Restoration Plan

1. Project: Red River of the North Fish Passage, Drayton Dam; Pembina County, North Dakota; Kittson County, Minnesota.

PWI No.: 167821

State Congressional District: North Dakota; and Minnesota District 07

2. Location: The Drayton Dam is located on the Red River of the North approximately 2 miles north of Drayton, North Dakota. The Drayton Dam is located in Pembina County, North Dakota, and Kittson County, Minnesota. A location map is provided as Attachment 1.

3. Red River of the North:

The Red River of the North (Red River) and adjoining valley is a valuable natural resource to eastern North Dakota and northwestern Minnesota. The Red River, on its meandering northerly path to Lake Winnipeg, provides the region with fertile agricultural lands, wildlife and fisheries habitat, and a source of potable surface water. The Red River has a very flat stream gradient, dropping only 200 feet in its 394-mile course from the confluence on the Ottertail and Bois de Sioux Rivers at Breckenridge, Minnesota, to the U.S.-Canada border. At Breckenridge, the stream gradient is just over 1 foot per mile, flattening to 0.2 foot per mile near the Canadian border.

a. Ecological Resources. The streams of the Red River basin support over 80 species of fish. The Red River is widely known for yielding trophy-size channel catfish and other game fish, including walleye, sauger, and northern pike. The Minnesota Department of Natural Resources has recently begun stocking lake sturgeon into the Red River in an attempt to reestablish this species, which is believed to have vanished from much of the system. The State of Minnesota currently considers the lake sturgeon a species of special concern. As recently as 1994, the lake sturgeon was considered extirpated from North Dakota.

The connectivity of the Red River main stem and its tributaries is important in maintaining the diversity of this river system. The connection to tributary habitat is very important, as these areas contain unique habitat characteristics not often found in the Red River main stem. For example, spawning habitat on the Red River main stem is largely lacking for most species. Although the Red River system supports a diverse fishery, certain habitat types are lacking on the Red River main stem. Fluctuating water quality along extensive reaches of the Red River is common due to land use practices within the watershed, as well as industrial and municipal water withdrawals and discharges. The silt/clay bottom and lack of in-stream cover provide limited spawning or rearing habitat for many fish species. Conversely, tributary streams often contain higher-gradient reaches with more exposed gravel, cobble, and rock substrates that are often used by a variety of species for spawning. Thus, tributary streams become important for fish reproduction, initial rearing, and establishment of initial year-class strength.

Although generally lacking in spawning habitat, the main stem provides important over-wintering habitat for certain fish found in tributaries. The main stem also serves as a source of recolonization of tributaries following droughts or fish kills.

These conditions underscore the importance of open migratory pathways and free movement up and down the river to seek optimum habitat in the tributaries and isolated areas of the main stem as seasonal conditions on the main stem change. With this understanding, tributary habitat, even intermittent tributaries, can provide important seasonal habitat for spawning, rearing, feeding, and other important life stages.

b. Human Resources. The many functions of the Red River provide a great benefit to the citizens of its valley. Over the last century, humans have modified the Red River system to benefit municipal, agricultural, and industrial development. This has included the development of low-head dams, primarily to provide a reliable water supply and water level control. Within the United States, eight low-head dams have been constructed on the main stem of the Red River (Table 1). Drayton Dam is the most downstream dam on the Red River prior to its entry into Canada, approximately 49 miles downstream.

Table 1. Distribution of low-head dams on the Red River of the North, North Dakota and Minnesota. The Red River crosses the international border into Canada at River Mile 158.0.

Dam No.	River Mile	Location
1	207.1	Drayton, North Dakota
2	296.1	Grand Forks, North Dakota-East Grand Forks, Minnesota
3	448.9	North Dam, Fargo-Moorhead (12^{th}/15^{th} Avenue) (Dam A)
4	452.2	Midtown Dam, Fargo-Moorhead (4^{th} Street) (Dam No. 1)
5	458.1	South Dam, Fargo-Moorhead (32^{nd} Avenue) (Dam No. 2)
6	482.7	Hickson, North Dakota (Dam No. 3)
7	496.6	Christine Dam, North Dakota
8	546.4	Wahpeton, North Dakota-Breckenridge, Minnesota

c. Effects to Fish Passage. Although the Red River has been modified for human use, these many uses may not always be completely compatible with ecological sustainability. While providing water supply and water control capabilities, these dams on the Red River main stem also serve as barriers to fish movement.

Riverine fishery resources have evolved to utilize a variety of habitats throughout their life cycle. Various life stages of fish use different habitats for spawning, feeding, resting, overwintering, and as refuge during floods and droughts. Moreover, fish frequently move long distances to meet certain desired habitat conditions, thus maximizing their fitness and ability to reproduce and pass on genetic material. Within the Upper Midwest, studies have documented long-distance migration for species such as lake sturgeon, catfish, walleye, and sauger. Fish within the Red River system likely depend on the ability to move great distances to access necessary habitats within either the Red River main stem or its adjoining tributaries. Some have attributed the disappearance of lake sturgeon to the Red River low-head dams blocking historic spawning

migrations to the upstream tributary streams. For these reasons, fish passage past low-head dams is likely important to healthy fishery communities on the Red River system.

As mentioned previously, valuable spawning habitats exist in the upstream reaches of the Red River and its tributary streams. Currently, fish movement past the dams typically may occur only during periods when high streamflows raise tailwater levels enough to "flood" or "wash out" the dam, allowing upstream passage past the dams. During high flow periods, fish passage over some Red River dams is not regarded as problematic. However, high-flow periods do not always coincide with the spawning season for all fish species. Moreover, during the majority of the remaining year (e.g., normal or low flow periods), these structures effectively create isolated stream segments, limiting access to important habitat areas. This is especially critical in those areas where there are few or no tributaries, and/or low habitat diversity, within the isolated segment.

To date, ecosystem restoration projects targeting improved fish passage have been completed at Dams 2, 3, 4 and 8 (Table 1). In addition to this project, planning is currently under way to investigate fish passage at South Dam (5), Hickson Dam (6), and Christine Dam (7.). The Minnesota Department of Natural Resources, in its draft Region I Land Management Plan, has established a watershed-wide goal of removing or modifying artificial barriers to fish migration.

Man-made modifications on the Red River have likely had an adverse effect on fish populations by reducing access to habitat. Loss of stream bank and in-stream cover and access to spawning and wintering habitat have likely caused changes in fish community structure and a reduction in fish numbers and fish species diversity on the river. The Environmental Impact Study of Flood Control Impoundments in Northwestern Minnesota, dated July 1996, prepared by the St. Paul District, U.S. Army Corps of Engineers and the Minnesota Department of Natural Resources, contains additional discussion and references on this subject.

d. Project Site: Drayton Dam. The Drayton Dam was constructed in 1964 for water supply associated with the municipal and agricultural interests. It is a concrete weir structure with a spillway length of 255 feet. Its crest elevation is about 12 feet above the natural channel bottom.

The Drayton Dam operates solely as a run-of-the-river structure, offering no flood control capabilities or low-flow augmentation releases. The dam creates a pool of water within the channel, which facilitates extraction of raw water through shoreline water supply intake structures. The pool also may provide a degree of groundwater surcharge and surface water storage. The existing pool also enhances slope stability on the riverbanks.

In regard to fish passage, the higher the dam crest elevation, the greater the potential for restricted fish movement. The ability of fish to migrate upstream over a dam depends on the relative tailwater and pool levels, along with the dam height and current velocities. It is likely that the Drayton Dam is typically passable only when the tailwater level approaches the water surface elevation at the crest, and corresponding water velocities are reduced. For Drayton, this likely occurs at flows approaching 7,000 cubic feet per second (cfs). However, flows of 7,000

cfs or greater occur less than 15 percent of the time based on average annual flows. For the important migrational months of March through June, flows of 7,000 cfs or greater may occur less than 15 percent of the time in March, about 55 percent of the time in April, less than 40 percent of the time during May, and only about 25 percent of the time during June. In some years, conditions favorable for upstream fish passage may never occur.

Table 2. Water elevations and corresponding velocities associated with Drayton Dam, Red River of the North, near Drayton, North Dakota. Dam becomes passable for most native fish at around 7,000 cfs.

Discharge (cfs)	Downstream Elevation (ft)	Upstream Elevation (ft)	Current Velocity over Dam (fps)
0	753.5	763.0	-
2,890	763.9	765.5	6.94
5,040	767.6	767.7	3.87
6,750	770.4	770.4	2.95
9,610	774.4	774.5	2.03
18,700	784.4	784.4	1.22
36,000	792.5	792.5	1.16
50,600	794.9	794.9	1.30
66,800	796.5	796.5	1.48
91,200	798.3	798.3	1.72
112,000	799.4	799.4	1.90
135,000	800.5	800.5	2.09
169,000	802.0	802.0	2.33

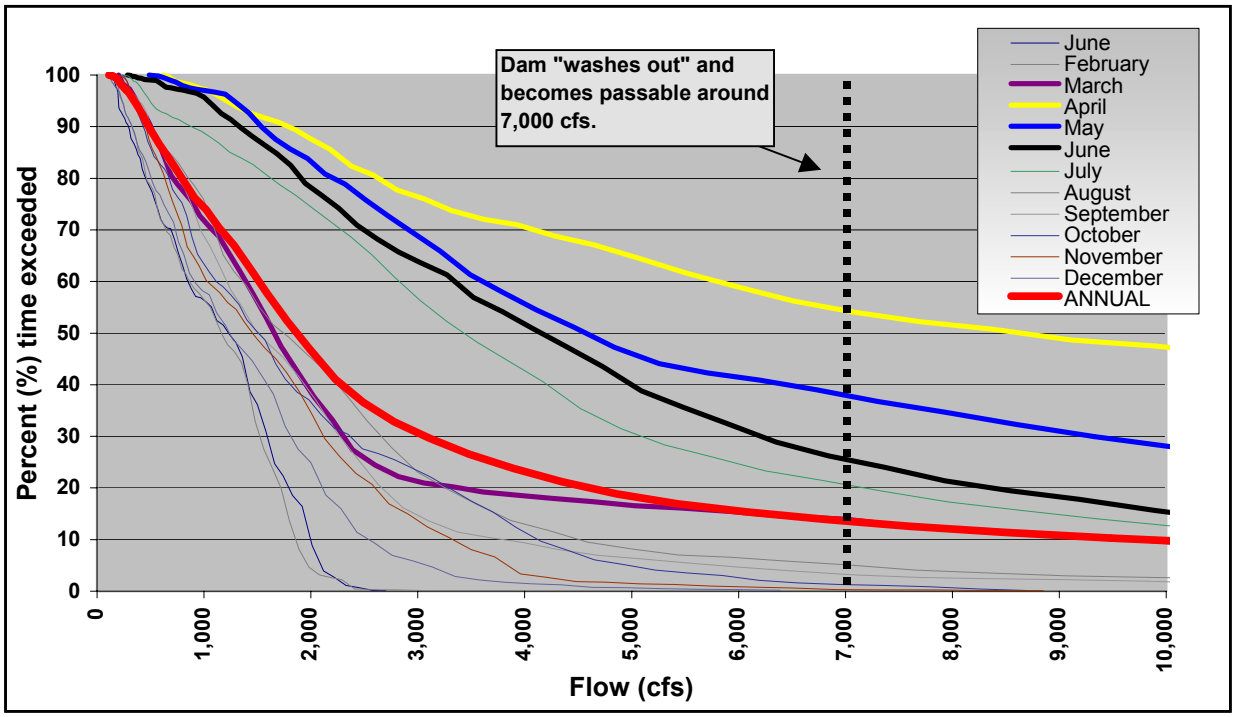

Figure 1. Flow exceedance probability for the Red River of the North at Drayton, North Dakota. Drayton Dam likely becomes passable to most fish species around 7,000 cfs, with passage ability increasing at higher flows.

To date, several fish passage projects have been constructed on the Red River of the North. Projects to restore fish passage have been completed at the Grand Forks-East Grand Forks Dam, the North and Midtown Dams in the Fargo-Moorhead area, and the Wahpeton Dam. The Army Corps of Engineers has been directly involved with the Grand Forks-East Grand Forks, North and Midtown Dam projects. Modifications for safety, fish passage, and navigation were accomplished at the Wahpeton Dam through a collaborative effort funded by the Minnesota Department of Natural Resources, North Dakota Game and Fish Department, Wahpeton Park Board, and Ottertail River Revival Association.

In addition to these completed projects, planning is currently under way for fish passage facilities at the Drayton Dam, as well as at the South, Christine, and Hickson Dams. The planning process was recently initiated for the dam at Drayton, with this Preliminary Restoration Plan (PRP) representing the early planning process. Similarly, a PRP is under preparation for projects at Christine and Hickson Dams. The South Dam recently had a Planning and Design Analysis (PDA) completed for fish passage facilities, with the project currently under review by Mississippi Valley Division.

With the proposed fish passage work at Drayton, a significant portion of the Red River would become nearly 100 percent passable by most, if not all, native fishes. In combination with the projects at Grand Forks-East Grand Forks and at Fargo-Moorhead, free fish movement would be possible from the Drayton Dam up to South Dam. If projects were implemented at South Dam, as well as Christine and Hickson Dams, fish passage would be opened up throughout the entire Red River main stem, from the U.S.-Canada border up into the upper tributaries of the Red River. It is hoped such projects would restore migrational corridors to conditions similar to those existing prior to dam construction. This would represent a major accomplishment in terms of reconnecting a main stem fragmented by numerous low-head dams.

4. Description of Proposed Ecosystem Restoration Project:

Multiple alternatives would be considered for any Section 206 project. For the purpose of this PRP, we considered the following alternatives.

a. No Action Plan. The alternative of making no changes to the Drayton Dam would lead to continued disruptions of the migratory cycles of fish in the Red River of the North. With fish passage addressed at several other Red River dams, it becomes more important to address the problem at the only remaining barriers in the Red River system. Drayton Dam, in addition to being a barrier to fish passage, can create dangerous conditions in the tailwater and could be considered a hazard to public safety. The provision of a fishway would also improve the safety of the structure. For these reasons, a no action alternative would not appear to be desirable.

b. Dam Removal Plan. From a fishery resource perspective, removal of the dam would most directly address the issue of migration. However, the structures were initially constructed for water supply. This is still a viable function, and the project sponsor will desire to maintain this structure. These desires must be respected since the project is dependent upon its sponsor, and a project alternative contrary to the needs of the sponsor would likely not be supported or

funded. For the purpose of this PRP, it will be assumed that dam removal is not a viable option.

c. Rock Ramp Fishways. This project will consider multiple alternatives to address fish passage at the Drayton Dam. For the purpose of this PRP, we will evaluate a proposed project that would construct a rock slope fishway at Drayton Dam, using a design similar to that used at the Grand Forks-East Grand Forks fish passage project. Future project geometry would be closely coordinated with both the Minnesota Department of Natural Resources and the North Dakota Game and Fish Department. Fill, bedding, and riprap would be placed on a 5-percent slope from the top of the dam to a point approximately 1 foot below low tailwater, then sloped at 16.7 percent beyond to the natural river bottom. Large protruding rocks (boulders) in the slope would produce significantly reduced velocities compared to existing flows on the downstream face of the dam.

d. Other Possible Alternatives. Should this project enter the next phase of planning, additional alternatives would be considered for implementation of fish passage at Drayton Dam. This could include, but not necessarily be limited to, various bypass channels options around Drayton Dam. It is likely that such alternatives may provide a more cost-effective fish passage structure, and also better meet the needs of the project sponsor. These alternatives were not pursued here because of the restricted financial nature of reconnaissance level studies, but they would be investigated during feasibility studies.

5. Views of the Sponsor:

The City of Drayton requested the assistance of the Corps of Engineers in addressing issues at the Drayton Dam by letter dated November 15, 1999 (Attachment 2). That letter indicated an interest in pursuing a Section 206 project at Drayton Dam. A meeting was held with the sponsor on May 13, 2003, to discuss this project and view the project site. The sponsor maintained an interest in a potential project. Members of the Minnesota Department of Natural Resources and the North Dakota Game and Fish Department also attended this meeting, and supported further investigation into a potential project.

The City of Drayton will be asked to provide a letter of intent expressing its continued interest in pursuing a project, as well as its willingness to meet the non-Federal requirements for implementation of a cost-effective project alternative identified within feasibility. The cost-effective alternative identified during feasibility studies may be different from that discussed here. When received, this letter of intent will be forwarded to Mississippi Valley Division as support for the request for authorization and funding of the next phase of study.

6. Views of Federal, State, and Regional Agencies: To date, no formal coordination has been pursued with State or Federal agencies. However, the St. Paul District has recently met with State biologists from both North Dakota and Minnesota to briefly discuss fish passage at Drayton Dam. Both agencies appeared enthusiastic about potential fish passage at Drayton Dam. Moreover, recent fish passage projects on the Red River have been highly supported by the resource agencies.

7. Status of Environmental Compliance: An Environmental Assessment will be prepared during the next study phase.

8. Costs and Benefits: The following discusses resulting benefits and identified project costs.

a. Ecosystem Restoration Benefits.

The primary benefits associated with the proposed project would be the improvement of the fisheries through removal of barriers to seasonal fish movement up and down a larger segment of the Red River. Without extensive studies, the benefits associated with the proposed action can only be generally quantified. This is particularly the case with fish passage projects in which benefits are extremely difficult to quantitatively predict.

Previous restoration efforts have used the U.S. Fish and Wildlife Service's 1980 version of Habitat Evaluation Procedures (HEP-80) to quantify and evaluate potential project effects and benefits. This methodology uses a Habitat Suitability Index (HSI) to rate habitat quality on a scale of 0 to 1 (1 being optimum). The HSI is multiplied by the number of acres of available habitat to obtain Habitat Units (HUs). One HU is defined as 1 acre of optimum habitat. By comparing existing HUs to HUs expected to be gained with a proposed action, the benefits can be quantified.

Unfortunately, evaluating systemic benefits resulting from fish passage is in many ways more difficult than evaluating site-specific benefits associated with other common restoration projects. As such, the use of HEP may not necessarily be appropriate for quantifying benefits from fish passage. Fish passage can benefit a wide range of fish species, as well as freshwater mussels and possibly other aquatic organisms. Moreover, different fish species may use specific areas and types of upstream habitat during certain time periods. However, while fish passage provides beneficial access to additional habitat, it is not creating or restoring the habitat itself, because such habitat already exists under base conditions. Furthermore, quantitatively predicting population or community response from fish passage is often extremely difficult.

Therefore, the resulting benefits from fish passage were quantified in terms of habitat made accessible. Ideally, the quality of upstream habitat would be identified to further evaluate the benefits of fish passage. However, this reconnaissance level of evaluation does not lend itself to adequately assessing habitat quality through the use of IBI (Index of Biological Integrity) indices, multiple HSI models, or other habitat quality indicators. Therefore, benefits for this project will be quantified in terms of stream habitat reconnected.

From a broad ecosystem perspective, providing fish passage at the Drayton Dam would reconnect the river below the dam to about 250 miles of Red River main stem habitat, extending up to the next impassable barrier at South Dam. If fish passage were provided at South Dam, as well as at Hickson and Christine Dams, fish would have the ability to extend well over 300 miles of upstream main stem habitat, with hundreds of miles of additional tributary habitat. This would essentially include the entire main stem of the Red River system within the United States.

Admittedly, some of these upstream passage benefits have been claimed previously as a part of

other Red River fish passage projects constructed by the District. However, the true value of river connectivity is that it should be additive. The addition of each additional fish passage structure reconnects that much additional habitat. For the purpose of discussion, benefits will be included for the 250 river miles extending up to South Dam. However, it can be noted that the next upstream fish passage project exists at Grand Forks, North Dakota, and East Grand Forks Minnesota, which occurs about 90 miles upstream.

The primary project benefits would include improvement of fisheries throughout the Red River basin by allowing fish to migrate to important spawning habitats upstream of Drayton. The Drayton Dam is currently passable only during high-flow conditions (7,000 cfs or more), and thus still hinders the ability of fisheries resources to successfully migrate upstream. This hindrance could result in poor spawning and initial year-class success. This can be important for many species, but especially for species such as lake sturgeon, which do not reproduce every year.

Conversely, the proposed Rock Ramp alternative would allow fish passage under most flow conditions. The man-made rock slope fishway would appear and function as a natural rock rapids. A larger amount and greater diversity of habitats would be available to those species previously isolated below this dam. In addition to improved availability of main stem habitat, access to higher quality spawning habitats present upstream would more importantly be improved. In addition to facilitating migration, the fishway would create habitat for fish and other aquatic organisms and increase stream habitat diversity. It may also improve downstream water quality. The man-made rapids may provide spawning habitat for lake sturgeon. Other benefits include improved public safety, aesthetics, and recreational opportunities.

It is estimated that the proposed project would provide access to about 250 miles of additional habitat virtually 100 percent of the time. Conversely, under existing conditions, the Drayton Dam would be passable about 15 percent of the time annually, and from 15 to 55 percent of the time during the most critical migratory months. For the purpose of comparison, we will assume that, on average, Drayton Dam would be passable 35 percent of the time during the period March through June. If this "accessibility" were prorated (i.e., multiplied) by the amount of habitat provided by passage, a no-project alternative would provide about 88 miles of habitat (250 miles x 35 percent). This compares to 250 miles with the proposed project, a "net improvement" of 162 miles over existing conditions.

b. Safety Benefits. In conjunction with the ecosystem restoration project, local officials indicated that the proposed project could provide the potential for improved safety conditions adjacent to the dam. Existing conditions are quite hazardous during high-flow conditions due to heavy turbulence and hydraulic conditions at the dam. Implementation of the proposed structure would help to reduce hazardous conditions during high-flow events.

c. Recreation Benefits. In conjunction with the ecosystem restoration project, local officials indicated potential recreation benefits that may result from such a project. These include activities such as canoeing, which is currently discouraged within the dam area due to the inherent dangers associated with low-head dams. The Minnesota Department of Natural Resources has recently designated the Red River of the North as a canoeing and boating river.

The Red River of the North is widely renowned for its quality fishing opportunities for channel catfish and other species.

d. Projected Project Costs.

The total preliminary estimated construction cost for the alternative discussed, including the Planning, Engineering and Design phase (PED), would be $2,600,000 (Attachment 3). Concern exists that the proposed project would likely require some additional rock work shortly after construction due to settlement of materials. This settlement would potentially occur as a result of poor soil and substrate conditions beneath the existing dam structure. Because of the reconnaissance nature of this study, the extent of this additional rock work was difficult to determine. However, it was estimated that this could be addressed for about $480,000 within the first few years following construction (Attachment 4). This amount was added to the initial construction cost for a final construction cost of $3,080,000. For a 50-year project life at the current discount rate of 5.875 percent, the project's average annual cost would be $180,950.

The current project design would require minimal operation and maintenance. Operation and maintenance would consist of periodic inspection and occasional replacement of rock material as needed after extreme events. It is not possible to predict how much these activities would cost over the life of the project; however, it is expected that the average annual operation and maintenance cost might be in the range of $8,000.

The project's total average annual cost would be $188,950 to produce an increase of 162 prorated "miles" of additional habitat available. Therefore, the cost of achieving the habitat benefits would be approximately $1,166 per prorated mile.

The projected cost of the fishway appears acceptable for the realized benefits. Admittedly, the comparison of cost per "average habitat unit" is extremely difficult between separate projects, particularly when compared to projects from other regions. The projected cost of this fishway is somewhat higher than those for other fishways on the Red River system. However, this also would be the most downstream location for implementing fish passage, with a larger river system and more complex site conditions. The project costs also are still within the generally broad range of costs for aquatic ecosystem restoration projects that have been pursued within the St. Paul District. Most importantly, this project would provide significant benefits, especially when combined with other fish passage projects that have been implemented on the Red River. The Drayton project would be another important piece in reconnecting the entire main stem of the Red River of the North. In this case, it would be reconnect the most downstream areas within the United States to its upper watershed. This unique opportunity is worth the project costs as currently formulated.

It should be noted that the District believes lower cost alternatives may exist that could result in similar benefits for the project at Drayton. Because of the low funds and level of effort available for the PRP project phase, the District elected to evaluate a fish passage design similar to those used at other Red River locations. However, other innovative alternatives may be available, given the unique conditions of the project site. These alternatives will certainly be considered and evaluated within the feasibility phase, and may become the preferred alternative. These

alternatives may prove more cost effective, providing equal project benefits for a cost below that estimated for this alternative considered within the PRP. A lower cost alternative also may better meet the needs of the project sponsor.

The City of Drayton, North Dakota, owns all required project lands, easements, and rights-of-way (LER) in fee, including fee and access easement in Kittson County, Minnesota, that would be required for the project. Federal/non-Federal cost shares under Section 206 are 65/35. The 35-percent cost share would be $1,078,000, which may include about $4,600 for LER and related administrative costs.

In summary, there appears to be justification for continued Federal participation in the project and in authorization and funding to proceed with an Environmental Restoration Report (ERR) and related Environmental Assessment (EA).

9. Schedule:

a. ERR/EA phase: 12 months
b. Plans and specifications phase: 6 months
c. Contract award: 2 months
d. Construction: 12 months

10. Financial Data:

The project construction costs identified above are used for the cost/benefit analysis and identification of the National Ecosystem Restoration (NER) project. However, costs associated with feasibility planning and preparation of the ERR and related EA also need to be included within the project costs for the purpose of cost share responsibilities. Feasibility planning often accounts for 10 to 15 percent of the projected construction costs. For this project, a 10 percent estimate for feasibility would cost $308,000. It is likely this would be above what would be necessary for feasibility planning. However, this value was selected for consistency, as well as to serve as a conservative estimate of feasibility planning. This increases the total project cost to $3,388,000, of which the Federal share would be $2,202,200.

a. Costs. The ERR/EA phase and plans and specifications phase are initially federally financed. The non-Federal share of those costs, less non-Federal LER expenditures, will be recaptured during the implementation (construction) phase.

Table 3. Preliminary Draft Project Costs for the discussed project alternative for the Drayton Dam Section 206 Project.

Project Costs ($1,000)								
				Federal Funding Needs				
Phase	Total	Non-Fed	Fed	FY04	FY05	FY06	FY07	Balance to Complete
ERR/EA	$ 308	$ 0	$ 308	$308	$ 0	$ 0	$ 0	$ 0
Plans and specifications	$ 393	$ 0	$ 393	$ 0	$ 393	$ 0	$ 0	$ 0
Implementation (construction)	$2,687	$1,186	$1,501	$ 0	$1,104	$1,103	$ 480	$ 0
TOTAL	$3,388	$1,186	$2,202	$308	$1,497	$1,103	$ 480	$ 0

b. Non-Federal Requirements ($1,000).

LEERDs	$ 4.6
Cash	$ 1,181.4
Work-in-kind	$ 0.0
Annual operation, maintenance, repair, rehabilitation, and replacement	$ 8.0

c. Fully Funded Cost as Found in the PCA. $ 3,388.0

11. Federal Allocations to Date ($1,000):

PRP	$ 10.0
ERR/EA	$ 0.0
Plans and specifications	$ 0.0
Implementation (construction)	$ 0.0

Attachment 1. Location of the potential 206 project at Drayton Dam, Drayton, North Dakota.

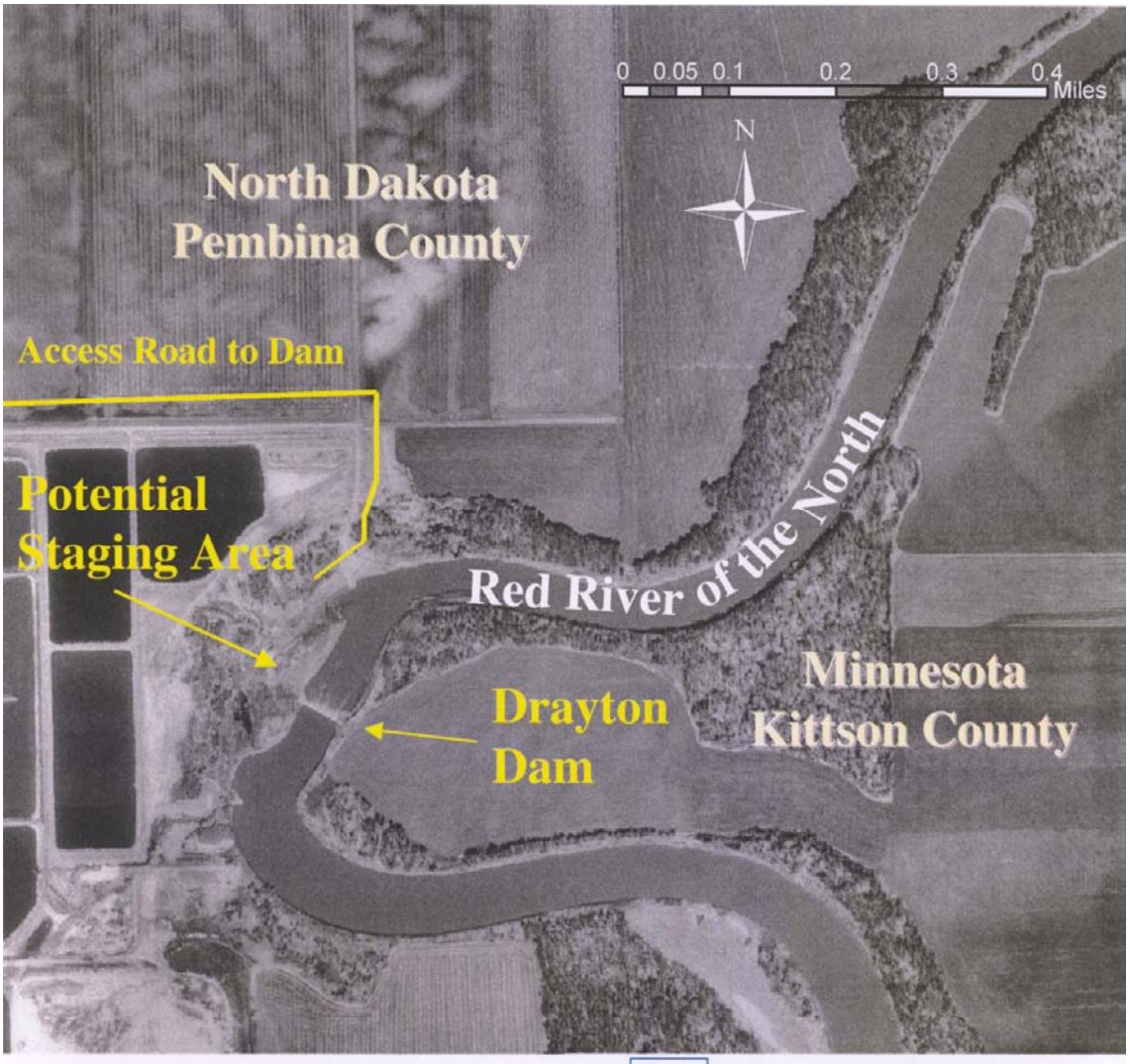

Figure 1. Project area for Drayton Dam 206 Aquatic Ecosystem Restoration Project near Drayton,

Attachment 2. Letter from City of Drayton requesting study of a potential 206 project at Drayton Dam, Drayton, North Dakota.

CITY OF DRAYTON

P.O. Box 280
Drayton, ND 58225
(701) 454-3590

November 15, 1999

Tom Crump
St. Paul District, Corps of Engineers
Project Management and Development Branch
190 5th Street East
St. Paul, Minnesota 55101-1638

Dear Mr. Crump:

This letter is to request the U.S. Army Corps of Engineers to conduct a study under Section 206 of the Water Resources Development Act of 1996 to determine the feasibility of modifying the Drayton Dam.

The Drayton Dam was built in 1964 under sponsorship of the North Dakota State Water Commission. It is a low-head dam which supports diversions by American Crystal Sugar Co. and the City of Drayton. The dam has always been a safety issue, with many drowing deaths recorded. The dam is also in need of modifying because of erosion problems and soil instabilities.

It is understood that, if it were found feasible and advisable to develop this project, the City of Drayton and other state agencies would be required to provide the local cooperation and cost sharing prescribed by the Secretary of the Army.

Sincerely,

Richard W. Johnson

Richard Johnson
Mayor
City of Drayton

Attachment 3. Preliminary estimated cost summary for initial construction of one project alternative evaluated for fish passage at Drayton Dam.

PROJECT COST SUMMARY
Drayton, North Dakota, Section 206, Red River of the North
Drayton Dam Aquatic Restoration

Project: Drayton, North Dakota, Section 206, Aquatic Restoration
Location: Drayton, North Dakota

Date: 9/5/2003

Prepared by: Richard H. Femrite
Cost Engineering and Specifications Section, CEMVP-ED-D

Checked by: James B. Mosner
Chief, Cost Engineering and Specifications Section, CEMVP-ED-D

No.	Description	July 2003 Pricing (.09 & .11 June 2003 price level) Estimated Amount ($)	Contingency Amount ($)	Contingency Percent (%)	Estimated Amount Plus Contingency ($)	OMB Index To Oct-03 (%)	OMB Indexed Cost To 10/2003 ($)	Midpoint Of Feature	OMB Index To Midpoint Factor (%)	Escalated Amount Amount ($)	Escalated Amount Contingency ($)	Escalated Amount Amount Plus Contingency ($)
1	2	3	4	5	6	7	8	9	10	11	12	13
.01	Lands and Damages (July 2003 pricing)	7,308	1,827	25%	9,100	0.00%	9,000	Feb-05	3.70%	8,000	2,000	10,000
.02	Relocations	0	0	na	0	na	0	na	na	0	0	0
.06	Fish and Wildlife Facilities (April 2000 dollars	1,424,900	500,700	35%	1,925,600	6.70%	2,055,000	Aug-05	4.80%	1,593,000	560,000	2,153,000
.09	Channels and Canals	0	0	na	0	na	0	na	na	0	0	0
.11	Levees and Floodwalls	0	0	na	0	na	0	na	na	0	0	0
.13	Pumping Plant	0	0	na	0	na	0	na	na	0	0	0
.14	Recreation Facilities	0	0	na	0	na	0	na	na	0	0	0
.15	Floodway Control and Diversion Structures	0	0	na	0	na	0	na	na	0	0	0
.16	Bank Stabilization	0	0	na	0	na	0	na	na	0	0	0
	Subtotal Features .00 thru .20	1,424,900	500,700									
.30	Planning, Engineering and Design	213,700	74,800	35%	288,500	6.70%	308,000	Feb-05	3.70%	236,000	83,000	319,000
.31	Construction Adiministration	106,900	37,400	35%	144,300	6.70%	154,000	Aug-05	4.80%	120,000	42,000	162,000
	Subtotal Features .08 thru .31	1,745,500	612,900		2,358,400							
.32	Hazardous, Toxic and Radioactive Waste	0	0	na	0	na	0	na	na	0	0	0
	Estimated Project Costs	$1,752,808	$614,727	35%	$2,367,500		$2,526,000			$1,957,000	$687,000	$2,644,000

Based on level of design and detail of estimate use $2,600,000

Notes:

a) Unless otherwise indicated, construction related costs include construction prime contractor overhead and profit.
b) Unless otherwise indicated, cost estimates are based on historical data and experience.
c) PED estimated amount (basic) furnished by project manager.
d) Feature 06 Fish and Wildlife Facilites costs in April 2000 dollars
e) Feature 01 Lands and Damages in July 2003 dollars
f) Quantities and features have been updated to reflect the most current design

PROJECT COST BREAKDOWN

Drayton, North Dakota, Section 206, Red River of the North

Drayton Dam Aquatic Restoration

Date: 9/5/2003 Richard Femrite, CEMVP-ED-D

	Description	Units	Quantity	Unit Price ($/U)	Estimated Amount ($)	Contingency Amount ($)	Contingency Percent (%)
.06	**Fish and Wildlife Facilities (April 2000 dollars)**		**Drayton - Section 206**				
.01	**Mob., Demob, & Job Prep**						$39,900
1	Mob., demob, & job prep (@ 2%)	JB	1.0	27,900	$27,900	$12,000	43%
	Subtotal Mob, Demob, & Job Prep:				27,900	12,000	43%
.02	**Clearing and Snagging**						$6,700
1	Clearing and Snagging	JB	1.0	5,000	$5,000	$1,700	34%
	Subtotal Mob, Demob, & Job Prep:				5,000	1,700	34%
.03	**Fishway Construction**						
1	Sheetpile (PZ-27)	SF	12,000.0	$25.70	308,400	108,000	35%
2	Steel Channel (MC 18x42.7)	TN	5.7	$1,600.00	9,100	3,200	35%
3	Conc Fill - King Piles (Not Used)	CY	0.0	$200.00			
4	Granular Fill	TN	1,365.0	$37.40	51,100	18,000	35%
5	Lightweight Fill (Not Used)	TN	0.0	$156.00		0	
6	Geotextile	SY	9,000.0	$2.00	18,000	6,300	35%
7	Bedding	TN	500.0	$37.40	18,700	6,500	35%
8	Riprap R270	TN	24,000.0	$37.30	895,200	313,000	35%
9	Derrick Stone	EA	312.0	$220.00	68,600	24,000	35%
10	Turfing, seed	AC	5.0	2,000	10,000	3,500	35%
11	Signs	JOB	1.0	12,900	12,900	4,500	35%
	Subtotal Bypass Channel:				$1,392,000	$487,000	35%

Total Estimated Amount for this Feature	$1,424,900	$500,700
Total Estimated Amount with Contingency for this Feature		**$1,925,600**

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Attachment 4. Preliminary estimated cost summary for required rock work following initial construction of the project alternative evaluated for fish passage at Drayton Dam.

PROJECT COST SUMMARY
Drayton, North Dakota, Section 206, Red River of the North
Drayton Dam Aquatic Restoration - Add 2 feet of rock to account for settlement

Project: Drayton, North Dakota, Section 206, Aquatic Restoration
Add 2 feet of rock and reposition derrick stone
Location: Drayton, North Dakota

Date: 9/9/2003

Prepared by: Richard H. Femrite
Cost Engineering and Specifications Section, CEMVP-ED-D

Checked by: James B. Mosner
Chief, Cost Engineering and Specifications Section, CEMVP-ED-D

No.	Description	April 2000 Pricing				OMB Index To Oct-03	OMB Indexed Cost To 10/2003	Midpoint Of Feature	OMB Index To Midpoint Factor	Escalated Amount		
		Estimated Amount	Contingency Amount	Contingency Percent	Estimated Amount Plus Contingency					Amount	Contingency	Amount Plus Contingency
		($)	($)	(%)	($)	(%)	($)		(%)	($)	($)	($)
1	2	3	4	5	6	7	8	9	10	11	12	13
.01	Lands and Damages	0	0	na	0	na	0	na	na	0	0	0
.02	Relocations	0	0	na	0	na	0	na	na	0	0	0
.06	Fish and Wildlife Facilities (April 2000 dollars	233,400	81,700	35%	315,100	6.70%	336,000	Aug-08	11.70%	278,000	97,000	375,000
.09	Channels and Canals	0	0	na	0	na	0	na	na	0	0	0
.11	Levees and Floodwalls	0	0	na	0	na	0	na	na	0	0	0
.13	Pumping Plant	0	0	na	0	na	0	na	na	0	0	0
.14	Recreation Facilities	0	0	na	0	na	0	na	na	0	0	0
.15	Floodway Control and Diversion Structures	0	0	na	0	na	0	na	na	0	0	0
.16	Bank Stabilization	0	0	na	0	na	0	na	na	0	0	0
	Subtotal Features .06 thru .20	233,400	81,700									
.30	Planning, Engineering and Design	46,700	16,300	35%	63,000	6.70%	67,000	Feb-08	10.10%	55,000	19,000	74,000
.31	Construction Adiministration	17,500	6,100	35%	23,600	6.70%	25,000	Aug-08	11.70%	21,000	7,000	28,000
	Subtotal Features .06 thru .31	297,600	104,100		401,700							
.32	Hazardous, Toxic and Radioactive Waste	0	0	na	0	na	0	na	na	0	0	0
	Estimated Project Costs	$297,600	$104,100	35%	$401,700		$428,000			$354,000	$123,000	$477,000

Notes:

Based on level of design and detail of estimate use $480,000

a) Unless otherwise indicated, construction related costs include construction prime contractor overhead and profit.
b) Unless otherwise indicated, cost estimates are based on historical data and experience.
c) PED estimated amount (basic) furnished by project manager.
d) Feature 06 Fish and Wildlife Facilites costs in April 2000 dollars
e) Quantities and features have been updated to reflect the most current design